WHILE LOOPS

DEFINITION

- A loop is a block of code that repeats itself while a condition is met.

- In a program, sometimes a block of code needs to be repeated.

- The ability to use repetition in a program makes the code shorter, uses less memory and therefore runs faster.

TYPES OF LOOPS

- **Conditional loops**
  - A loop statement that keeps looping while a condition is met

- **Counted loops**
  - A loop statement that loops a predetermined (to the loop structure) fixed number of times

SYNTAX

while (condition):

      block of code to be completed if condition is true

- Syntactically, it is very similar to the if statement (***if*** is swapped for ***while***)
- If the condition is true, the block is executed over and over until the condition is false

EXAMPLE 1:

```
num = 0
while (response != "EXIT"):
    response = input("Type EXIT to stop the loop\n")
    num = num+1
print (num)
```

- However, this program will not run! WHY?

EXAMPLE 1 ERROR:

NameError: name 'response' is not defined

THE SENTRY VARIABLE

- This is the variable that is used in the condition that controls the loop.

- In the previous example, it is the variable '*response*'.
  - The program is attempting to compare '*response*' to "EXIT" but the variable '*response*' has not been created yet!

- The sentry variable needs to be created and initialized before it is used as a part of the condition of the loop

EXAMPLE 1 - IMPROVEMENT

```
num = 0
response = " "

while (response != "EXIT"):
    response = input("Type EXIT to stop the loop\n")
    num = num+1
print (num)
```

EXAMPLE 2 — TRACE THIS

num = -2
while (num < 3):
    num = num+1
print (num)

MEMORY	OUTPUT

EXAMPLE 2 – TRACING SOLUTION

num = -2
while (num < 3):
    num = num+1
print (num)

MEMORY	OUTPUT
num= -2, -1, 0, 1, 2, 3	3

EXAMPLE 3: WHAT IS THE OUTPUT?

```
num = 0
while (num > 3):
    num = num+1
print (num)
```

EXAMPLE 3:

num = 0

while (num > 3):

   num = num+1

print (num)

** note that the program never enters the loop because the condition is not met at the beginning!

Outputs 0 to the screen

EXAMPLE 4: WHAT IS THE OUTPUT?

```
num = 0
while (num < 3):
    num = num-1
print (num)
```

EXAMPLE 4:

num = 0

while (num < 3):

   num = num-1

print num

▪This is known as an infinite loop. It never stops!

INFINITE LOOP EXAMPLE

```
while (True):
    print ("Hello")
```